

Notice of Allowability	Application No.	Applicant(s)	
	10/084,016	GALLAGHER, ANDREW C.	
	Examiner	Art Unit	
	Sath V. Perungavoor	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTO-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. This communication is responsive to 04/19/2005.
- 2: The allowed claim(s) is/are 1-8, 10-17 and 19-20 (Renumbered 1, 2, 8, 4-7, 3, 9-16 and 17-18).
3. The drawings filed on 27 February 2002 are accepted by the Examiner.
4. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All
 - b) Some*
 - c) None
 of the:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) hereto or 2) to Paper No./Mail Date _____.
 - (b) including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. Notice of References Cited (PTO-892)
2. Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 2/27/02
4. Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. Notice of Informal Patent Application (PTO-152)
6. Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. Examiner's Amendment/Comment
8. Examiner's Statement of Reasons for Allowance
9. Other _____.

DETAILED ACTION

EXAMINER'S CLAIM RENUMBERING

- [1] Examiner renumbers the amended claims as follows.
1. **Claim 8 is renumbered to Claim 3**
 2. **Claims 3, 10, 11, 12, 13, 14 and 15 are renumbered to Claims 8, 9, 10, 11, 12, 13 and 14.**
 3. **Claims 16, 17, 19 and 20 are renumbered to Claim 15, 16, 17 and 18.**

Response to Amendment

- [2] The response filed on 19 April 2005 has been entered and made of record.

Response to Arguments/Amendments

- [3] Applicant's arguments filed on 19 April 2005 have been fully considered.

Claim Rejections - 35 USC § 101

Summary of Arguments:

Applicant asserts that the amendments made to the independent claims overcome the double patenting rejection. Applicant requests the withdrawal of the rejection.

Examiner's Response:

Agreed. Examiner withdraws the previously made rejection.

EXAMINER'S AMENDMENT

- [4] An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by

37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Robert Luke Walker (Reg. No. 30,700) on 24 May 2005.

The application has been amended as follows:

Claim 1:

A method of sharpening a digital image having image pixels according to its noise content, comprising the steps of:

generating a noisy pixel belief map corresponding spatially to the image pixels having belief values indicating the likelihood that the modulation about respective pixels are due to system noise, said noisy pixel belief map being based upon both a local noise measure of pixels of the digital image and a noise table separate from said digital image; and

using the noisy pixel belief map to vary a variable parameter of an image sharpener;

wherein the step of generating a noisy pixel belief map comprises the steps of:
creating a low resolution version of the digital image;
generating a low resolution noisy pixel belief map from the low resolution version
of the digital image; and
interpolating the low resolution noisy pixel belief map to produce the noisy pixel
belief map.

Claim 9:

Claim 9 is cancelled.

Claim 16:

A method of sharpening a digital image having image pixels according to its noise content, comprising the steps of:

subsampling said digital image to a predetermined number of subsampling levels to provide a subsampled image;

generating a noisy pixel belief map from said subsampled image, said noisy pixel belief map being based upon a local noise measure of pixels of the digital image, a noise table separate from said digital image, and said number of subsampling levels;

using the noisy pixel belief map to vary a variable parameter of an image sharpener; and

applying said image sharpener to said digital image;

wherein said generating further comprises:

generating a low resolution noisy pixel belief map from said subsampled image; and

interpolating said low resolution noisy pixel belief map to produce said noisy pixel belief map.

Claim 18:

Claim 18 is cancelled.

Claim 19:

Claim 19 is made dependent on a claim 16, instead of cancelled claim 18.

REASONS FOR ALLOWANCE

[4] The following is an examiner's statement of reasons for allowance: The instant invention is a noise adaptive image sharpening method.

Regarding claims 1, 3 and 16, prior art was found for generating a noisy pixel belief map based on the noise measure from local variance of pixels in an image and a noise table of expected variance; and using the noisy the noisy pixel belief map to vary a variable parameter to sharpen an image [US 5,038,388]. Prior art was also found for generating the low-resolution version of the digital image and generating a low-resolution noisy pixel belief map from the low-resolution version of the digital image [US 5,461,655].

Applicant uniquely claimed a distinct feature in the instant invention, which are not found in the prior art, either singularly or in combination. The feature is the **interpolation of the low-resolution noisy pixel belief map to produce the noisy pixel belief map**. The applicant's states in page 6 lines 5-9 of the specification that generating the noisy pixel belief map at a low resolution and interpolating to the original resolution provides significant computational advantages.

Following is the excerpt from the relevant section in the specification.

5 effects of aliasing. Generating the noisy pixel belief map from a low resolution image saves substantial time (as compared with generating the noisy pixel belief map from the image $i(x,y)$) since there are fewer pixels upon which calculations are performed. Preferably, $R=2$, which saves approximately 94% of the processing time required to perform the same operations on the image $i(x,y)$.

This feature is not found or suggested in the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

[5] Claims 1-8, 10-17 and 19-20 are allowed and are renumbered as stated above

in section [1].

Contact Information

[6] Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mr. Sath V. Perungavoor whose telephone number is (571) 272-7455. The examiner can normally be reached on Monday to Friday from 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Bhavesh M. Mehta whose telephone number is (571) 272-7453, can be reached on Monday to Friday from 9:00am to 5:00pm. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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May 26, 2005


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